Integrated Navigation Test 1 Practice (Sample)

Study Guide

BY EXAMZIFY

Everything you need from our exam experts!

Sample study guide. For the full version with hundreds of questions, visit:
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Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- **Practice answering questions under realistic conditions,**
- **Improve accuracy and speed,**
- **Review explanations to strengthen weak areas, and**
- **Approach the exam with greater confidence.**

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

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How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here’s how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don’t just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There’s no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

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Questions

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1. **What is carrier-phase ambiguity in GNSS and why is resolving it important?**
   - A. The antenna phase center variation.
   - B. The satellite's clock bias.
   - C. The unknown integer number of carrier cycles; resolving ambiguities enables centimeter-level precision.
   - D. The unknown phase between satellites.

2. **What element does a pseudorange measurement include that enables estimation of receiver clock error?**
   - A. Satellite clock bias included in measurement.
   - B. Attitude angles.
   - C. Receiver clock bias included in measurement.
   - D. Only geometric distance.

3. **Which sequence represents the standard radar setup order?**
   - A. Brilliance, Gain, Heading, Range, Tuning
   - B. Brilliance, Heading, Gain, Tuning, Range
   - C. Gain, Brilliance, Range, Tuning, Heading
   - D. Heading, Range, Brilliance, Tuning, Gain

4. **What is the frequency of S-band (approximately 3 cm) used in radar systems?**
   - A. 1,000 MHz
   - B. 6,500 MHz
   - C. 3,070 MHz
   - D. 12,000 MHz

5. **Within what time frame should ARPA present an object's predicted motion?**
   - A. Within 1 minute
   - B. Within 3 minutes
   - C. Within 5 minutes
   - D. Within 15 minutes

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6. What does VRM stand for?

A. Variable Range Marker
B. Visual Range Marker
C. Virtual Range Monitor
D. Velocity Range Marker

7. How quickly should the ARPA present a motion trend?

A. Within 1 minute
B. Within 3 minutes
C. Within 5 minutes
D. Within 10 minutes

8. What is the purpose of propagating the covariance in the prediction step?

A. To eliminate all uncertainty before the measurement update.
B. To propagate the current estimate uncertainty to the next step ahead of the measurement update.
C. To adjust only the gravity model parameter.
D. To reset the EKF state to zero.

9. The ADC provides which measurements used to augment INS estimates?

A. Airspeed, altitude, and angle of attack.
B. Magnetic heading and yaw rate.
C. Ground speed only.
D. Temperature and humidity.

10. What does ARPA stand for?

A. Automatic Radar Plotting Aid
B. Automatic Radar Planning Algorithm
C. Advanced Radar Processing Application
D. Auto Radar Plotting Assistant

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Answers

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1. C
2. C
3. A
4. C
5. B
6. A
7. A
8. B
9. C
10. A

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Explanations

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1. What is carrier-phase ambiguity in GNSS and why is resolving it important?

A. The antenna phase center variation.

B. The satellite's clock bias.

C. The unknown integer number of carrier cycles; resolving ambiguities enables centimeter-level precision.

D. The unknown phase between satellites.

The idea being tested is carrier-phase ambiguity: when you measure the phase of the GNSS carrier, you only know the phase modulo one full cycle, so you don’t know how many whole carrier cycles have occurred between the satellite and the receiver. That unknown integer count for each satellite–receiver link is the carrier-phase ambiguity. Resolving these integers is what lets the highly precise carrier-phase data translate into accurate range measurements. Once the ambiguities are fixed, the phase data can be combined across time and satellites to achieve centimeter-level precision, which is why ambiguity resolution is essential in high-precision GNSS techniques like RTK and precise positioning. Other concepts mentioned, such as antenna phase-center variations or satellite clock biases, are real factors in GNSS positioning but do not describe the carrier-phase ambiguity itself, and the notion of an unknown phase between satellites isn’t how ambiguity is defined.

2. What element does a pseudorange measurement include that enables estimation of receiver clock error?

A. Satellite clock bias included in measurement.

B. Attitude angles.

C. Receiver clock bias included in measurement.

D. Only geometric distance.

Pseudorange measurements are not just the geometric distance to a satellite; they include a term for the receiver’s clock error. This receiver clock bias appears in the observation equation as an extra bias, effectively linking the measured time difference to the receiver’s time offset from true GPS time. By treating this bias as an unknown alongside position, you can solve for the receiver’s clock error when you have enough satellites (typically four or more). Satellite clock bias is also part of the model, but it’s the receiver clock bias term that enables estimating the receiver’s time error. Attitude angles don’t enter the pseudorange measurement, and using only geometric distance would leave the clock error unresolved.

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3. Which sequence represents the standard radar setup order?

A. Brilliance, Gain, Heading, Range, Tuning

B. Brilliance, Heading, Gain, Tuning, Range

C. Gain, Brilliance, Range, Tuning, Heading

D. Heading, Range, Brilliance, Tuning, Gain

Starting with Brilliance makes the display readable right away; you can't properly judge echoes if you can't see them. Next, set Gain to optimize how strong the echoes appear—too low and targets disappear, too high and clutter obscures them. Then adjust Heading so the radar image aligns with your vessel's orientation, ensuring bearings to targets are accurate. After that, pick the Range to get the appropriate sweep distance for the area you're monitoring, balancing target detail with coverage. Finally, perform Tuning to fine-tune the receiver for clean, stable echoes once the basic visibility and orientation are established. This order—Brilliance, Gain, Heading, Range, Tuning—helps you quickly obtain a usable, correctly oriented display before dialing in the final signal quality.

4. What is the frequency of S-band (approximately 3 cm) used in radar systems?

A. 1,000 MHz

B. 6,500 MHz

C. 3,070 MHz

D. 12,000 MHz

S-band radar systems operate roughly in the 2 to 4 GHz range. A frequency around 3,070 MHz sits right in that band, making it a typical S-band value. The note about a 3 cm wavelength would actually correspond to about 10 GHz (X-band), so the 3 cm figure in the prompt doesn't align with S-band. In short, 3,070 MHz is a standard S-band frequency. For context, L-band is about 1–2 GHz, C-band about 4–8 GHz, and X-band about 8–12 GHz.

5. Within what time frame should ARPA present an object's predicted motion?

A. Within 1 minute

B. Within 3 minutes

C. Within 5 minutes

D. Within 15 minutes

ARPA's predicted motion is a short-range forecast of where a tracked object will be in the near future, based on its current course and speed. The idea is to give the navigator enough time to assess risk and decide on an action, while keeping the forecast reliable. Three minutes is the practical horizon because it provides a useful planning window for collision avoidance without relying on more uncertain long-term behavior. Predictions beyond this interval become less reliable due to potential course changes, speed variations, or maneuvers by the target, so the ARPA forecast stays accurate enough to inform decisions within that time frame. Shorter horizons, like one minute, may not give sufficient time to react in fast-developing situations, while longer horizons (five or more minutes) tend to overestimate certainty and risk.

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6. What does VRM stand for?

A. Variable Range Marker

B. Visual Range Marker

C. Virtual Range Monitor

D. Velocity Range Marker

The concept tested is radar terminology and how distance is measured on the radar display. A Variable Range Marker is an adjustable marker on the radar screen that lets you set a specific distance from your own vessel. By moving this marker to align with a target, you can read off the distance from the scale, giving you the target's range. This tool is often used together with Electronic Bearing Lines to determine position by both range and bearing. The other terms aren't standard radar jargon. Visual Range Marker would imply a marker tied to visual sighting rather than radar, and Virtual Range Marker or Velocity Range Marker aren't common terms in navigation radar.

7. How quickly should the ARPA present a motion trend?

A. Within 1 minute

B. Within 3 minutes

C. Within 5 minutes

D. Within 10 minutes

The idea is to keep the navigator's view of a target's future path as fresh as possible. ARPA calculates a motion trend using recent position updates to estimate the target's velocity and turn rate, which lets you predict where it will be in the near future. Because ships can change speed or course quickly, updating this trend within a short time frame is essential for timely decisions. If the motion trend were updated much later—say after several minutes—the information could be outdated, reducing your ability to assess collision risk and take early evasive or corrective action. Updating within one minute provides the quickest, most actionable indication of how the target is moving now and where it's likely headed next.

8. What is the purpose of propagating the covariance in the prediction step?

A. To eliminate all uncertainty before the measurement update.

B. To propagate the current estimate uncertainty to the next step ahead of the measurement update.

C. To adjust only the gravity model parameter.

D. To reset the EKF state to zero.

The purpose of propagating the covariance in the prediction step is to forecast how uncertain the state will be at the next time step before any new measurement is incorporated. By applying the motion model (using its Jacobian to linearize the dynamics) and adding the process noise, you map the current uncertainty forward and obtain the predicted covariance. This predicted covariance expresses how confident you are about the forecasted state and sets up the Kalman update to balance the prediction with the incoming measurement. It's not about eliminating all uncertainty, nor about adjusting a gravity parameter, nor resetting the state to zero.

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9. The ADC provides which measurements used to augment INS estimates?

A. Airspeed, altitude, and angle of attack.

B. Magnetic heading and yaw rate.

C. Ground speed only.

D. Temperature and humidity.

External measurements help keep the inertial navigation estimates accurate by tying the motion to the air mass. The Air Data Computer provides values that directly constrain the INS: airspeed, altitude, and angle of attack (with temperature used to infer air density). These air measurements anchor the velocity and vertical position estimates in a real flight condition, reducing drift over time. Ground speed, on the other hand, is obtained from Doppler or GPS sensors, not from the air data computer, so it isn't the data the ADC provides to augment the INS. Humidity isn't typically used for INS augmentation, and while temperature affects density, the primary augmentation comes from airspeed and altitude (and angle of attack when applicable).

10. What does ARPA stand for?

A. Automatic Radar Plotting Aid

B. Automatic Radar Planning Algorithm

C. Advanced Radar Processing Application

D. Auto Radar Plotting Assistant

ARPA is about automatic radar plotting and tracking of targets. The name stands for Automatic Radar Plotting Aid. It automatically detects radar returns, calculates each target's range, bearing, course, and speed, and projects future positions. It also computes the Closest Point of Approach and Time to CPA to assess collision risk and can display predicted tracks and alarms on the radar screen. The other options don't match the established terminology, as they suggest planning, advanced processing, or generic assistance rather than the specific automatic plotting aid described by ARPA.

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Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we’d love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

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We wish you the very best on your exam journey. You've got this!

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